

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Shigeki NOMURA et al

Appl. No : 10/540,564

Filed : June 24, 2005

For : PROTON CONDUCTING MEMBRANE, METHOD FOR PRODUCING THE  
SAME AND FUEL CELL USING THE SAME

## INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents  
U.S. Patent and Trademark Office  
Customer Window, Mail Stop Amendment  
Randolph Building  
401 Dulany Street  
Alexandria, VA 22314

Sir:

Pursuant to 37 C.F.R. § 1.56 and 37 C.F.R. §§ 1.97-1.98, Applicants hereby direct the Examiner's attention to the following document cited in the International Search Report for International Application PCT/JP2004/001179 of which the above-referenced application claims priority:

- (1) JP 2002-184427, June 28, 2002, accompanied by an English language abstract thereof (provided by esp@cenet); Applicants note that this document is also cited and discussed at page 41, second paragraph of the present application;
- (2) JP 2003-331644, November 21, 2003, accompanied by an English language abstract thereof (provided by esp@cenet).

Further, Applicants direct the Examiner's attention to the following additional documents, which are cited and discussed in the present application:

- (3) U.S. Patent No. 4,330,654 (EZZELL et al.), May 18, 1982; Applicants note that this document is cited and discussed at page 4, first paragraph of the present application
- (4) JP 4-366137, December 18, 1992, accompanied by an English language abstract thereof (provided by esp@cenet); Applicants note that this document is cited and discussed at page 4, first paragraph of the present application;
- (5) JP 6-342665, December 13, 1994; Applicants note that this document is cited and discussed at page 4, first paragraph of the present application;
- (6) U.S. Patent No. 5,449,697 (NOAKI et al.), September 12, 1995; Applicants note that this document is a family member of document (5);
- (7) JP 9-110982, April 28, 1997, accompanied by an English language abstract thereof (provided by esp@cenet); Applicants note that this document is cited and discussed at page 8, first paragraph of the present application;
- (8) JP 10-21943, January 23, 1998; Applicants note that this document is cited and discussed at page 8, first paragraph of the present application;
- (9) U.S. Patent No. 5,985,477 (IWASAKI et al.), November 16, 1999; Applicants note that this document is a family member of document (8);
- (10) JP 10-45913, February 17, 1998; Applicants note that this document is cited and discussed at page 8, first paragraph of the present application;
- (11) U.S. Patent No. 6,087,031 (IWASAKI et al.), July 11, 2000; Applicants note that this document is a family member of document (10);
- (12) JP 9-87510, March 31, 1997, accompanied by an English language abstract thereof (provided by esp@cenet); Applicants note that this document is cited

and discussed at page 8, first paragraph of the present application;

- (13) U.S. Patent No. 6,242,135 B1 (MUSHIAKE), June 5, 2001; Applicants note that this document is cited and discussed at page 9, second paragraph of the present application;
- (14) Tatsumisago M., et al. "Proton-Conducting Silica-gel Films Doped With a Variety of Electroytes" Solid State Ionics, 1994, 74, 105-108; Applicants note that this document is cited and discussed at page 9, third paragraph of the present application;
- (15) JP 8-249923, September 27, 1996; Applicants note that this document is cited and discussed at page 9, fourth paragraph of the present application;
- (16) U.S. Patent No. 5,682,261 (TAKADA et al.), October 28, 1997; Applicants note that this document is a family member of document (15);
- (17) JP 10-68917, March 10, 1998, accompanied by an English language abstract thereof (provided by esp@cenet); Applicants note that this document is cited and discussed at page 10, first paragraph of the present application;
- (18) Gautier-Luneau I., et al. "Organic-Inorganic Protonic Polymer Electrolytes as Membrane for Low-Temperature Fuel Cell" Electrochimica Acta, 1992, 37 (9), 1615-1618; Applicants note that this document is cited and discussed at page 33, second paragraph of the present application;
- (19) Sanchez J.-Y., et al. "Poly(benzylsulfonic acid)siloxane as Proto-conducting Electrolyte" Polymers for Advanced Technologies, 1993, 4, 99-105; Applicants note that this document is cited and discussed at page 33, second paragraph of the present application;

- (20) WO 03/041091 A1, May 15, 2003; Applicants note that this document is cited and discussed at page 41, first paragraph of the present application;
- (21) U.S. Patent Application Publication No. 2004/0062970 A1 (NOMURA et al.), April 1, 2004; Applicants note that this is a family member of document (20);
- (22) Slade R.C.T., Varcoe J.R. "Proton Conductivity in Siloxane and Ormosil Ionomers Prepared Using Mild Sulfonation Methodologies" Solid State Ionics, 2001, 145, 127-133; Applicants note that this document is cited and discussed at page 42, second paragraph of the present application;
- (23) Mikhailenko S., et al. "Solid Electrolyte Properties of Sulfonic Acid Functionalized Mesostructured Porous Silica" Microporous and Mesoporous Materials, 2002, 52, 29-37; Applicants note that this document is cited and discussed at page 42, third paragraph of the present application;
- (24) Depre L., et al. "Inorganic-Organic Proton Conductors Based on Alkylsulfone Functionalities and Their Patterning by Photoinduced Methods" Electrochimica Acta, 1998, 43 (10-11), 1301-1306; Applicants note that this document is cited and discussed at page 43, second paragraph of the present application;
- (25) Depre L., et al. "Proton Conducting Sulfon/Sulfonamide Functionalized Materials Based on Inorganic-Organic Matrices" Electrochimica Acta, 2000, 45, 1377-1383; Applicants note that this document is cited and discussed at page 43, second paragraph of the present application;
- (26) JP 9-40911, February 10, 1997; Applicants note that this document is cited and discussed at page 54, first paragraph of the present application;
- (27) U.S. Patent No. 5,902,847 (YANAGI et al.), May 11, 1999; Applicants note that

this document is a family member of document (26);

- (28) JP 8-134219, May 28, 1996, accompanied by an English language abstract thereof (provided by esp@cenet); Applicants note that this document is cited and discussed at page 54, first paragraph of the present application;
- (29) JP 2002-30149, January 31, accompanied by an English language abstract thereof (provided by esp@cenet); Applicants note that this document is cited and discussed at page 54, first paragraph of the present application;
- (30) Abe Y., et al. "Preparations and Properties of Flexible Thin Films by Acid-Catalyzed Hydrolytic Polycondensation of Methyltrimethoxysilane" Journal of Polymer Science: Part A: Polymer Chemistry, 1995, 33, 751-754; Applicants note that this document is cited and discussed at page 54, first paragraph of the present application;
- (31) Takamura N., et al. "Preparation and Properties of Polysilsesquioxanes: Polysilsesquioxanes and Flexible Thin Films by Acid-Catalyzed Controlled Hydrolytic Polycondensation of Methyl- and Vinyltrimethoxysilane" Journal of Polymer Science: Part A: Polymer Chemistry, 1999, 37, 1017-1026.

Copies of the above-listed documents (with the exception of U.S. Patents and the U.S. Patent Application) and the International Search Report (in English) for International Application No. PCT/JP2004/001179 are enclosed together with a completed copy of the Form PTO 1449 listing the above documents. Accordingly, the Examiner is requested to consider these documents and to indicate such consideration by returning a signed and initialed copy of the Form PTO 1449 with the next official communication.

Further to the U.S. Patent and Trademark Office's decision to partially waive the requirements under 37 C.F.R. § 1.98 (a)(2)(i) and (iii), copies of the U.S. patents and U.S. patent applications cited above are not enclosed herewith. However, if any copies are needed, the Examiner is respectfully requested to contact the undersigned.

Applicant notes that an Office Action on the merits has not issued in the present application, and thus no fee is believed necessary to ensure consideration of the submitted material.

If there are any questions, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,  
Shigeki NOMURA et al.



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FORM PTO-1449

U.S. Department of Commerce  
Patent and Trademark OfficeAtty. Docket No.  
P28019Application No.  
10/540,564INFORMATION DISCLOSURE STATEMENT  
BY APPLICANT  
(Use several sheets if necessary)Applicant  
Shigeki NOMURA et al.Filing Date  
June 24, 2005Group  
Not Yet Assigned

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	4 3 3 0 6 5 4	05/18/82	EZZELL et al.			
	5 4 4 9 6 9 7	09/12/95	NOAKI et al.			
	5 9 8 5 4 7 7	11/16/99	IWASAKI et al.			
	6 0 8 7 0 3 1	07/11/00	IWASAKI et al.			
	6 2 4 2 1 3 5	06/05/01	MUSHIAKE et al.			
	5 6 8 2 2 6 1	10/28/97	TAKADA et al.			

## FOREIGN PATENT DOCUMENTS

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES NO
2002	- 1 8 4 4 2 7	06/28/02	JAPAN			
2003	- 3 3 1 6 4 4	11/21/03	JAPAN			
4	- 3 6 6 1 3 7	12/18/92	JAPAN			
6	- 3 4 2 6 6 5	12/13/94	JAPAN			
9	- 1 1 0 9 8 2	04/28/97	JAPAN			
10	- 2 1 9 4 3	01/23/98	JAPAN			
10	- 4 5 9 1 3	02/17/98	JAPAN			
9	- 8 7 5 1 0	03/31/97	JAPAN			
8	- 2 4 9 9 2 3	09/27/96	JAPAN			
10	- 6 8 9 1 7	03/10/98	JAPAN			

## OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

1	English Language Abstract of JP 2002-184427.
2	English Language Abstract of JP 2003-331644.
3	English Language Abstract of JP 4-366137.
4	English Language Abstract of JP 9-110982.
5	English Language Abstract of JP 9-87510.
6	Tatsumisago M., et al. "Proton-Conducting Silica-gel Films Doped With a Variety of Electroytes" Solid State Ionics, 1994, <u>74</u> , 105-108.
6	English Language Abstract of JP 10-68917.
7	Gautier-Luneau I., et al. "Organic-Inorganic Protonic Polymer Electrolytes as Membrane for Low-Temperature Fuel Cell" Electrochimica Acta, 1992, <u>37</u> (9), 1615-1618.
8	Sanchez J.-Y., et al. "Poly(benzylsulfonic acid)siloxane as Proto-conducting Electrolyte" Polymers for Advanced Technologies, 1993, <u>4</u> , 99-105.
9	Slade R.C.T., Varcoe J.R. "Proton Conductivity in Siloxane and Ormosil Ionomers Prepared Using Mild Sulfonation Methodologies" Solid State Ionics, 2001, <u>145</u> , 127-133.

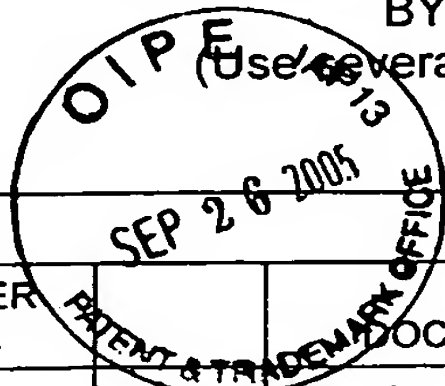
EXAMINER

DATE CONSIDERED

\*EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



FORM PTO-1449		U.S. Department of Commerce Patent and Trademark Office		Atty. Docket No. P28019	Application No. 10/540,564
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)				Applicant Shigeki NOMURA et al.	
				Filing Date June 24, 2005	Group Not Yet Assigned



## U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	2004 0 0 6 2 9 7 0	04/01/04	NOMURA et al.			
	5 9 0 2 8 4 7	05/11/99	YANAGI et al.			

## FOREIGN PATENT DOCUMENTS

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES NO
03	/ 0 4 1 0 9 1	05/15/03	W.I.P.O			
9	- 4 0 9 1 1	02/10/97	JAPAN			
8	- 1 3 4 2 1 9	05/28/96	JAPAN			
2002	- 3 0 1 4 9	01/31/02	JAPAN			

## OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

10	Mikhailenko S., et al. "Solid Electrolyte Properties of Sulfonic Acid Functionalized Mesostructured Porous Silica" Microporous and Mesoporous Materials, 2002, <u>52</u> , 29-37.
11	Depre L., et al. "Inorganic-Organic Proton Conductors Based on Alkylsulfone Functionalities and Their Patterning by Photoinduced Methods" Electrochimica Acta, 1998, <u>43</u> (10-11), 1301-1306.
12	Depre L., et al. "Proton Conducting Sulfon/Sulfonamide Functionalized Materials Based on Inorganic-Organic Matrices" Electrochimica Acta, 2000, <u>45</u> , 1377-1383.
13	English Language Abstract of JP 9-40911.
14	Abe Y., et al. "Preparations and Properties of Flexible Thin Films by Acid-Catalyzed Hydrolytic Polycondensation of Methyltrimethoxysilane" Journal of Polymer Science: Part A: Polymer Chemistry, 1995, <u>33</u> , 751-754.
15	Takamura N., et al. "Preparation and Properties of Polysilsesquioxanes: Polysilsesquioxanes and Flexible Thin Films by Acid-Catalyzed Controlled Hydrolytic Polycondensation of Methyl- and Vinyltrimethoxysilane" Journal of Polymer Science: Part A: Polymer Chemistry, 1999, <u>37</u> , 1017-1026.
16	English Language Abstract of JP 8-134219.
17	English Language Abstract of JP 2002-30149.

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